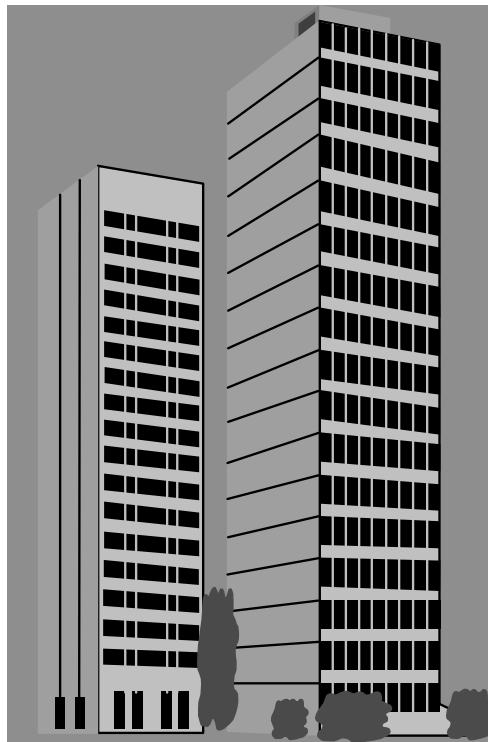


## **Appendix III**

**Indoor Air Quality Assessment  
MCCT  
14<sup>th</sup> Floor Holding Cell Control Room and Its Adjacent Rooms  
40 Thorndike Street  
Cambridge, Massachusetts  
October 1999**

# **INDOOR AIR QUALITY ASSESSMENT**

**Cambridge District Court  
Middlesex County Courthouse  
14<sup>th</sup> Floor Holding Cells Control Room Areas  
Cambridge, MA**



Prepared by:  
Massachusetts Department of Public Health  
Bureau of Environmental Health Assessment  
October, 1999

## **Background/Introduction**

In response to a previous request from Darryl Smith of the Cambridge District Court (CDC) an indoor air quality assessment was done at the Middlesex County Courthouse, 40 Thorndike Street, Cambridge, Massachusetts on November 25 and December 16, 1998 and January 4, 1999 (MDPH, 1999). This assessment was conducted by the Massachusetts Department of Public Health (MDPH), Bureau of Environmental Health Assessment (BEHA). Long-standing complaints from employees of headaches, fatigue and drowsiness are noted in previous reports by MDPH.

At the request of court officers who work in this area, a visit was made to this specific location in the Middlesex County Courthouse building by Michael Feeney, Chief of Emergency Response/Indoor Air Quality (ER/IAQ) on August 11, 1999. Mr. Feeney was accompanied by Rosa Chavez, the facilities manager of the Middlesex County Courthouse. Health complaints (e.g. headaches, fatigue, etc.) similar to those previously expressed were expressed during this current visit. During the time of the December 16 and January 4 assessments, BEHA personnel could not obtain access to the 14<sup>th</sup> floor holding cell control room and its adjacent rooms area (the CDC holding area) since the hallway entrance was secured.

The CDC is located in a twenty-three story multi-level building. This evaluation included the control room main office, the break room and restroom. This area has no openable windows. An elevator is used for the transport of prisoners and is located in the hallway opposite these rooms.

## **Methods**

Air tests for carbon dioxide were taken with the Telaire, Carbon Dioxide Monitor and tests for temperature and relative humidity were taken with the Mannix, ThPen PTH8708 Hygrometer/Thermometer.

## **Results**

The CDC holding area had three court officers and no prisoners during this evaluation. The tests were taken under normal operating conditions. Test results appear in Table 1.

## **Discussion**

### **Ventilation**

It can be seen from the tables that carbon dioxide levels were below 800 parts per million parts of air [ppm] in all areas sampled. These carbon dioxide levels are indicative of an adequate fresh air supply in this building.

Ventilation is provided by heating, ventilation and air-conditioning (HVAC) units located in mechanical rooms on each floor of the CDC. Fresh air is supplied by ceiling mounted air diffusers. Exhaust ventilation is provided by ducted, return air vents that are connected to an air-handling unit on the 14<sup>th</sup> floor. Exhaust vents in the rest room and break room were not drawing air during this evaluation. Exhaust ventilation is necessary in order to remove odors from the indoor environment.

In order to have proper ventilation with a mechanical supply and exhaust system, the systems must be balanced to provide an adequate amount of fresh air to the interior of

a room while removing stale air. The date of the last servicing and balancing of these systems could not be identified at the time of the visit.

The Massachusetts Building Code requires a minimum ventilation rate of 20 cubic feet per minute (cfm) per occupant of fresh outside air or have openable windows in each room (SBBRS, 1997). The ventilation must be on at all times that the room is occupied. Providing adequate fresh air ventilation with open windows and maintaining the temperature in the comfort range during the cold weather season is impractical. Mechanical ventilation is usually required to provide adequate fresh air ventilation.

Carbon dioxide is not a problem in and of itself. It is used as an indicator of the adequacy of the fresh air ventilation. As carbon dioxide levels rise, it indicates that the ventilating system is malfunctioning or the design occupancy of the room is being exceeded. When this happens a buildup of common indoor air pollutants can occur, leading to discomfort or health complaints. The Occupational Safety and Health Administration (OSHA) standard for carbon dioxide is 5,000 parts per million parts of air (ppm). Workers may be exposed to this level for 40 hours/week (OSHA, 1997).

The Department of Public Health uses a guideline of 800 ppm for publicly occupied buildings. A guideline of 600 ppm or less is preferred in schools due to the fact that the majority of occupants are young and considered to be a more sensitive population in the evaluation of environmental health status. Inadequate ventilation and/or elevated temperatures are major causes of complaints such as respiratory, eye, nose and throat irritation, lethargy and headaches.

Temperature readings were within a range of 72° to 73° F, which was within the BEHA recommended comfort range. The BEHA recommends that indoor air temperatures be maintained in a range between 70° to 78° F in order to provide for the

comfort of building occupants. While temperature readings outside the recommended range are not necessarily a health concern, increased temperature can affect the relative humidity in a building.

The relative humidity in this building was within the BEHA recommended comfort range of all areas sampled. Relative humidity measurements ranged from 54 to 59 percent. The BEHA recommends that indoor air relative humidity is comfortable in a range of 40-60 percent. The sensation of dryness and irritation is common in a low relative humidity environment. Low relative humidity is a very common problem during the heating season in the northeast part of the United States.

### **Other Concerns**

As with other areas noted in the March 1999 report, there appear to be signs in the CDC holding area that indicate a combustion source is penetrating into this building in and around elevator shafts. The air diffusers in the hallway of the CDC holding area show signs of a black soot deposition (see Picture 1). Several previous reports (MDPH, 1989; MDLWD, 1997) indicated that air diffusers were covered with a heavy buildup of particulates. In addition to residue, some air diffusers also show signs of corrosion in a pattern that is consistent with exposure to materials that do not appear to originate from within ductwork. As detailed in the previous report, the deposition noted around ceiling tiles may be attributed to exhaust pollutants from the parking garages by way of the elevator shafts.

During the current assessment, the heavy odor of spray paint was noted in the break room. Court officers reported that prisoner shackles were spray painted in the break room several hours prior to the BEHA visit. The exhaust vent for this room was

not drawing air, which would account for the lingering odor of spray paint. If this exhaust vent were drawing air, it is likely that the odor of spray paint would be entrained into the AHU that services the CDC holding area via the return vent and distributed to other rooms serviced by the HVAC system. Spray paint frequently contains volatile organic compounds (VOCs) which can be irritating to the eyes, nose and throat.

The main office contained an ozone-generating air purifier. At this time, the efficacy of ozone as an indoor air cleaner is being examined by several government agencies. While ozone may be effective in removing some odors of biological origin (such as skunk), its use as a universal air cleaner has come under question. (US EPA, 1998). Ozone is a highly irritating substance to the respiratory system. Until more definitive information becomes available, the use of ozone generators in occupied areas should be done with caution.

## **Conclusions/Recommendations**

Improvement to the overall indoor air quality issues at the CDC that were made in the BEHA March 1999 report would also be applicable to the CDC holding area. In addition to those recommendations, the following additional recommendations to improve indoor air quality in the CDC holding area are made:

1. Repair the exhaust vents in the break room and rest room.
2. Discontinue spray painting of prisoner shackles in the break room. Spray paint and drying spray painted materials should only be conducted in an area where VOCs cannot be entrained by the AHU, and has adequate local exhaust ventilation. If no adequate area for spray painting exists indoors, conduct this activity outdoors.

3. Consider discontinuing the use of ozone generators in the building. If use is continued, adequate ventilation should be utilized to prevent the build up of ozone within offices.



## References

MDLWD. 1997. Letter to Armando J. DeFillippis, Superintendent, Middlesex County Courthouse from Thomas Trayers of DLWFD, dated January 30, 1997. Department of Labor and Workforce Development, Division of Occupational Safety, West Newton, MA.

MDPH. 1989. Inspection Report for Middlesex District Courthouse. Massachusetts Department of Public Health, Division of Community Sanitation, Boston, MA.

MDPH. 1998. Indoor Air Quality Assessment Cambridge District Court, Middlesex County Courthouse, 13<sup>th</sup>, 14<sup>th</sup> and 15<sup>th</sup> Floors, Cambridge, Massachusetts. Massachusetts Department of Public Health, Bureau of Environmental Health Assessment, Boston, MA.

OSHA. 1997. Limits for Air Contaminants. Occupational Safety and Health Administration. Code of Federal Regulations. 29 C.F.R. 1910.1000 Table Z-1-A.

SBBRS. 1997. Mechanical Ventilation. State Board of Building Regulations and Standards. Code of Massachusetts Regulations. 780 CMR 1209.0

US EPA. 1998. Ozone Generators That Are Sold As Air Cleaners. An assessment of Effectiveness and Health Consequences. Indoor Environments Division, Office of Radiation and Indoor Air Programs, Office of Air and Radiation (6604j). Washington, DC.

**Picture 1**



**Heavy Particulate Deposition on Air Diffuser in Hallway of CDC Holding Cell Area**